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ABSTRACT

The Canadore College Continuing Education Division model for innovative individualized and personalized programs contains several subsystems: analysis of current continuing education, identification of criteria, evaluation of the old model, design of the new model, simulations, evaluation of the new model, and implementation of the new model. The framework for a systems approach to instructional innovation is provided through a process called anasynthesis which allows complex elements of learning processes to be integrated to provide solutions to educational problems. A graphic analog model using LOGOS computer programs was constructed to solve problems of individualized and personalized instruction through anasynthesis. Research findings using the model show that the value of lectures or seminars is dependent on the student. Cognitive styles of students help them adapt instructional strategies to meet their own needs and the most successful personalized education programs combine cognitive and affective strategies. (CH)

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AN INSTRUCTIONAL SYSTEMS TECHNOLOGY MODEL FOR INSTITUTIONAL CHANGE

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> The innovator makes enemies of all those who prospered under the old order, and only lukewarm support is forthcoming from those who would prosper under the new ... because men are generally incredulous, never really trusting new things unless they have tested them by experience."
>
> Niccolo Machiavelli

A STRATEGY FOR INSTITUTIONAL CHANGE

Our strategy to manage educational change in the Continuing Education Division at Canadore College has been to encourage an eclectic approach that mixes or blends the elements of the process of individualization and personalization. The final set or "mix" is decided upon to achieve the best or optimum combination of these elements for each student. This strategy recognizes that there is no one magic way to teach each student. We strive to account for each student, instructor, administrator and counsellor as an individual.

Our model has been based upon instructional systems technology.

WHAT IS INSTRUCTIONAL SYSTEMS TECHNOLOGY

There are several definitions of instructional systems technology but one that highlights all of the essential features is provided by the commission on instructional technology:

> ...a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication and employing a combination of human and non-human resources to bring about more effective instruction.[1]

Many people tell me that they are either using a systems-model or that they are taking a systems-approach to instruction. Unfortunately, there is no evidence of this in practice, in many cases. To state definitions is not enough. A systems-approach demands that we analyze, synthesize, model and simulate. This will become clear as we progress.

[1]"Six Characteristics in Search of a Profession, An Intellectual Technique". Howard B. Hitchens Jr., Audiovisual Instruction, November 1971, pp. 101-102.

AN INSTRUCTIONAL SYSTEMS TECHNOLOGY MODEL

When we first individualized our programs in the fall of 1970, we constructed a simple model. Since we did not have a method or a precise "language" we simply drew rectangles and described our process.[2] This was augmented by borrowing some of the items from the personalized education program model which has been employed at Oakland Community College[3]. As we began to introduce other elements in the process, we simply drew a few more rectangles and added them to the chart.

I felt this was not adequate to represent our developments and decided that the LOGOS (Language for Optimizing Graphically Ordered System)[4] language and process of anasynthesis[5] developed by Dr. Leonard Silvern could possibly lead us to sophisticated models that could assist us to consider the complex relationships of the elements of individualizing and personalizing our programs. The more we individualized the more complex relationships became apparent.

I now feel that any attempt to individualize and personalize education programs should commence with the process of anasynthesis as developed by Dr. Silvern.

In order to effectivly utilize anasynthesis, administrators, faculty and paraprofessionals must learn the process and the language.

To accomplish this at Canadore, I asked Dr. Silvern to train the entire staff. This led to a team of persons who could implement the processes of anasynthesis in our division. I will now describe the model that we are building and the process that we are going through.

[2]See Canadore Continuing Education 1970 model for the Implementation and Management of Individualized and Personalized Programs, Figure 1.

[3]See Oakland Community College model, Figure 2A and 2B.

[4]L. C. Silvern "LOGOS": A Systems Language for Flowchart Modeling, Educational Technology, June 1969.

[5]Anasynthesis - The process of analysis, synthesis, modeling and simulation.

It is essential that the graphic analog model excerpts should be referred to as I describe the model.[6] (It is an effort to understand, but the worth of the effort will be obvious to you.) Our division had been implementing a process of individualizing and personalizing for four years before we decided to build a sophisticated model and our first step involved a model of the current situation.

The Canadore Continuing Education Division Model for Innovative Individualized and Personalized Programs contains several subsystems, and appears in the appendix of this article as Figure 3. The subsystems are:

1.0 Analyze Current Canadore Continuing Education Model
2.0 Identify Criteria
3.0 Evaluate Old Model
4.0 Design New Model
5.0 Run Simulations
6.0 Evaluate New Model
7.0 Implement New Model

In subsystem 1.0 we analyze the current Canadore Continuing Education model. The subsystem 1.0 contains two subsystems referred to as 1.1 and 1.2 (these numbers[7] serve as quick references to the user of the model). In subsystem 1.1 we model the current functions and in 1.2 we analyze the model. Subsystem 1.1 contains three subsystems as seen in Figure 4. (Note: Each subsystem is given a specific number to accurately portray the sequence or flow of information from one subsystem to the next.)

1.1.1 Draw Model
1.1.2 Simulate Model to Test It
1.1.3 Evaluate Model 1:1 Correspondence to Canadore Continuing Education Situation

In subsystem 1.1.1 we draw a model of the current functions at Canadore. This model represents a "snapshot picture" of the way our program is. It contains a description of all of the elements of individualizing and personalizing developed and used to date, as well as a complete look at all administrative, faculty and paraprofessional current functions.

[6]See Canadore Continuing Education Division model excerpts. A bibliography is also available from the author.

[7]Point-numeric code.

Our objective is to produce a model of present functions which has a 1:1 correlation or correspondence with the actual program. In subsystem 1.1.2 we simulate (or tryout) the model to test it and in subsystem 1.1.3 we evaluate the model as to whether or not we have achieved a high "fidelity" (i.e. accuracy) with the real life situation. It is imperative that what actually exists is clearly identified before we progress.

In subsystem 1.2, Figure 4, we analyze the current model and the signal paths 1.2 to (follow the horizontal lines with arrow heads - these carry information from one subsystem to the following) 2.0 and 1.2 to 3.0 which indicate that the next step is to identify the criteria we will use to evaluate the old model. The results of our analysis of the current situation in 1.2 are fed forward (i.e. to be used later) to 3.0 where the current model will be evaluated. Examine Figure 3. Criteria for evaluation 2.0 are used in 3.0 to evaluate the old model and are fed forward to 6.0 where they are stored as information to be utilized when the new model reaches the evaluation stage in 6.0.

Our goal is to analyze the existing situation 1.0, design a new model 4.0, run simulations to test this new model in 5.0 and implement the new model in 7.0.

Refer to Figure 5. The subsystem 1.1.1 Draw Model contains two subsystems.

1.1.1.1 Conduct Project
1.1.1.2 Conduct BTSD (Basic Training for Skill Development - Adult Basic Education) Program

For two years we individualized and personalized our programs without the benefit of research or project assistance. We learned that to solve the problems that were occuring as we individualized we had to request additional funds. I asked the Research Section of the Ontario Ministry of Colleges and Universities for a grant of 70 thousand dollars to do a research and development project in the management and implementation of individualized and personalized programs.

The subsystem 1.1.1.1 represents the project and subsystem 1.1.1.2 represents the resulting BTSD Program.

At this point one should note the manner in which LOGOS (the language developed by Dr. Silvern) permits a simple start but allows for systematic progress to lower and lower levels of detail. We are, at this moment working at the fourth level of detail. (It is important that we become specific at each point in our analysis. The level of detail increases as we become more specific about the functions that have to be carried out at each point.)

The subsystem Conduct Project 1.1.1.1 shown in Figure 5 contains 10 subsystems:

1.1.1.1.1 Create New Ministry Proposal
1.1.1.1.2 Evaluate New Proposal Internally
1.1.1.1.3 Submit to Ministry of Colleges and Universities Research Section
1.1.1.1.4 Request Clarification/Modification Proposal
1.1.1.1.5 Modify Proposal
1.1.1.1.6 Evaluate Proposal (Ministry)
1.1.1.1.7 Reject Proposal (Ministry)
1.1.1.1.8 Decide to Operationalize
1.1.1.1.9 Operationalize Project
1.1.1.1.10 Terminate Project

The subsystem 1.1.1.1 permits us to use a model to advantage in Project Work. Subsystem 1.1.1.1.8 indicates that some portions of the Project Work are so critical that we must find a way to operationalize them even if Ministry funding is not forthcoming. The subsystem 1.1.1.1.9 has four subsystems. The most important subsystem here is 1.1.1.1.9.3. This subsystem receives input from the feedforward signal path 1.1.1.1.6. The subsystem 1.1.1.1.9.3 is the key to the implementation phase of all Continuing Education Division Project Work and all Project results are, after evaluation in 1.1.1.1.9.3, fed forward and utilized in the subsystem 1.1.1.2.4 Operationalize BTSD Program. In similar fashion, all problems arising in the day to day operation of the BTSD program are fed back from 1.1.1.2.4 to 1.1.1.1.9.1 which integrates research and implementation and permits researcher and line manager to work together to solve mutual problems and to develop and implement new ideas and findings.

A long range goal of our modeling is quantification and I feel that we will be able to use these models (when quantified or mathematized) to answer questions regarding cost benefit, cost utility and cost effectiveness.

The subsystem 1.1.1.2 Conduct BTSD Program contains five subsystems:

1.1.1.2.1 Propose Individualized Programs Days
1.1.1.2.2 Negotiate Proposal Ministry of Colleges & Universities/ Canada Manpower Centre/College
1.1.1.2.3 Reject Proposal
1.1.1.2.4 Operationalize Program
1.1.1.2.5 End Semi-Annual Cycle

We propose a block of training days to the Ministry of Colleges and Universities and Canada Manpower Centre for a 6 month period in 1.1.1.2.1 negotiations occuring in 1.1.1.2.2 and we either operationalize the program 1.1.1.2.4 or the proposal is rejected in 1.1.1.2.3.

The subsystem shows feedback from 1.1.1.2.3 to 1.1.1.2.1; and from 1.1.1.2.4.4 to (1.1.1.2.4.3), (1.1.1.2.4.2), (1.1.1.2.4.1); and from 1.1.1.2.5 to 1.1.1.2.1; and from (1.1.1.1.2.4.4) to (1.1.1.1.9.1).

The subsystem 1.1.1.2.4.3 Conduct Program is one of great interest to instructional technologists and curriculum personnel so we will look at its expansion in Figure 6.

Subsystem 1.1.1.2.4.3 contains several subsystems one of which is 1.1.1.2.4.3.1 Conduct Instruction. Subsystem 1.1.1.2.4.3.1 contains eight subsystems.

1.1.1.2.4.3.1.1 Conduct Orientation and Diagnosis
1.1.1.2.4.3.1.2 Place Student in the Program
1.1.1.2.4.3.1.3 Give Student Pre-Tests
1.1.1.2.4.3.1.4 Prescribe Objectives and Resources
1.1.1.2.4.3.1.5 Study Objectives Using Resources
1.1.1.2.4.3.1.6 Give Students Post-Tests
1.1.1.2.4.3.1.7 Evaluate Performance
1.1.1.2.4.3.1.8 Graduate Student

I would like to point out that we are at this momemt working with a model at the 8th level of detail. At this level of detail our view of instruction is still in gross overview format. This is an example of the use of models that are constructed systematically. By using this system we will be able to systematically take each function to lower and lower levels of detail, or higher resolution, in a rigorous fashion. This

permits us to gain an exact representation of instruction. Also, at the 8th level of detail the subsystem Conduct Instruction is complex but with LOGOS as a tool, or means of representing, we do not fear this complexity and can proceed to reach the level of exactness that we desire. We can also achieve the goal of considering the elements on individualizing and personalizing and their interrelationships with high resolution and without finding a situation which is too complex for our system. Anasynthesis permits us to solve very complex instructional problems. Subsystem 1.1.1.2.4.3.1 Conduct Instruction represents a situation in which the total program is individualized and personalized. This subsystem at lower levels of detail contains the details of all of the elements and interrelationships referred to in "Arriving at Individualization and Personalization" (Dudgeon, 1973) and "Innovative Approaches to Adult Basic Education" (Dudgeon, 1973, B.T.S.D. Review). The model and LOGOS provided us with an opportunity to represent our elements and their interrelationships in a way that achieves a level of specificity in keeping with our use of objectives in education.[8]

We have progressed from a systems-approach that was "hopeful" to one that truly gives the capacity for analysis, synthesis, modeling, and simulation. The process called "anasynthesis" provides the framework and the system for our division. We have taken a systematic approach to solving education problems and have constructed a graphic analog model using LOGOS language to be sure that we are actually using the process of analysis, synthesis, modeling and simulation.[9]

[8]Figure 7 shows subsystem 1.1.1.2.4.2 at a lower level of detail and is an example of the use of the summer function. See "Systems Engineering of Education XVIII: Roles of Feedback and Feedforward During Simulation", Leonard Silvern, ETC California 1974. Figure 8 is a graphic analog model used by Dudgeon at the 1974 National Educational Technology Conference in Miami, Florida to introduce beginners to the individualization and personalization of College ABE programs.

[9]For a list of models available, contact the author.

A SET OF ELEMENTS

The process of individualizing and personalizing instruction is made up of a large number of elements. Some of these isolated elements are: performance objectives, pre-tests, post-tests, criterion-referenced measurement, computerized data banks of objectives, items and resources, innovative architecture, The Educational Sciences including the cognitive styles of administrators, faculty, counsellors and students, mediation by design rather than chance, computer-managed tracking, computer-managed evaluation, computer management of instruction, instructors utilized as resource persons, peer tutoring, paraprofessionals, a variety of hardware and software, diagnosis of learning problems, prescriptions, measurement of retention, the use of sampling technique in evaluation to introduce economy into testing, objectives written with attention to taxonomic levels, sequencing of content from the lowest to highest across levels, a balance between cognitive and affective objectives. (The list is long but not complete.) I have not listed these elements in the order implemented, but the list serves to prove that an instructional systems technology model for change contains a great many elements. These elements are all complex. (Consider the increase in complexity that occurs if I ask you to begin to consider the interrelationships of these elements.) The elements and interrelationships are complex and we need the process of "anasynthesis" (analysis, synthesis modeling and simulation) to obtain solutions in complex systems.[10]

JARGON

At about this point many persons ask me if all the "jargon" is necessary. I admit that educational technologists use a language that is foreign to many educators but it is a fact that this language is a necessity if one is to learn, communicate, research, or apply the young science of instructional systems technology or any other discipline. Each field has its language and I encourage you to learn this language if you wish to become involved.

[10] L.C. Silvern, Systems Engineering of Education I: The Evolution of Systems Thinking in Education, E.T.C., California, 1971.

ELEMENTS AND INTERRELATIONSHIPS

In the Continuing Education Division at Canadore we combine the elements of individualization and personalization to meet the needs of each individual student. Each student has his/her own individual rate of learning and his/her own learning style.

WHICH IS BEST, LECTURE OR SEMINAR?

The answer is both. It depends on the student. Some students learn best by lectures and we must provide good lecturers to fill this need. There is nothing more damaging than to place a student, who does poorly in a group, into a seminar where the person will be expected to participate in order to achieve the objectives. If a seminar experience is necessary for a student's chosen vocation, and if he/she does poorly in groups, then we should identify this prior to instruction and augment the student's "group-interactive abilities" before expecting the student to attend and do well in a seminar. Many schools simply place this student in a seminar and leave him/her to "sink or swim".

There are many instructional methods or delivery modes: lecture, seminar, lecture-discussion, tutorial, peer-tutoring, independent study, CAI (Computer Assisted Instruction), programmed instruction, and others. Consider the problems when these modes are combined or interrelated with print, audio, visual, audio-visual, and all of the other varieties of presentation format. The situation becomes very complex when we consider the alternate media available for each mode: television, books, radio, audio tape, video tape, theatre, sociodrama, film and real life field experiences, slides, computers, etc.

COMPUTER MANAGED INSTRUCTION(CMI)

Computer Managed Instruction (CMI)[11] permits college managers to utilize the computer in managing the process of individualization and personalization. When programs are individualized, a great deal of complex information must be available to managers to avoid chaos.

[11]Not computer assisted instruction (CAI). Computer assisted instruction (CAI) is one of many modes for the delivery of instruction.

Imagine a college where 10,000 students are each receiving instruction based upon their individual needs. In a situation like this, the computer can be used to provide, in a sophisticated and economical way, the management information needed. How can the computer be used in the management of individualized and personalized programs? Most importantly, to provide a computerized data bank of objectives, items and resources. It can further be used in the evaluation process. The step by step progress of large numbers of students can be easily monitored. We can obtain pre-test, post-test and retention data without the armies of clerks usually associated with individualized learning. We can utilize concepts such as objective, item and person sampling techniques. Sampling technique and the computer can greatly reduce both the frequency and cost of achievement testing. The computer can be used to give computer assistance to such difficult jobs as curriculum validation and analysis. CMI can be used to help determine and allocate resources during the operation of an individualized and personalized program. In short, we probably have only begun to see the possible uses of the computer in the management of instruction and education programs.[12]

COGNITIVE STYLE

Concepts such as cognitive style have an almost infinite number of applications in individualized and personalized programs. Cognitive style has been developed by Dr. Joseph E. Hill based upon four assumptions about the human being:

1. Education is the process of searching for meaning.
2. Thought is different from language.
3. Man is a social creature with a unique capacity for deriving meaning from his environment and personal experiences through the creation and use of symbols.
4. Not content with biological satisfactions alone, man continually seeks meaning.

[12]For further information about the Computer Managed Instruction System (CMI) used in the Canadore College Continuing Education Division contact the author of this paper. Several papers on The Canadore Comprehensive Achievement Monitoring system (CAM) and the Canadore Mathematics Bank of Objectives, Items and Resources (Mathematics BOIR) are available from Dean Dudgeon at Canadore.

An individual's cognitive style is determined by the way he takes note of his total surroundings - how he seeks meaning, how he becomes informed. Is he a listener or a reader? Is he concerned only with his own viewpoint or is he influenced in decision-making by his family or associates? Does he reason as a mathematician, or as a social scientist, or as an automotive mechanic?[13]

The commitment of the Canadore Continuing Education Division is to determine the way in which a student learns, adapt instructional strategies to that style to guarantee successes, and to augment in a designed manner, the students lesser strengths or weaknesses. The seven educational sciences as defined by Dr. Hill are:

1. Symbols and their meanings
2. Cultural determinants of the meanings of symbols
3. Modalities of inference
4. Biochemical and electrophysiological aspects of memory
5. Cognitive styles of individuals
6. Teaching styles, administrative styles and counselling styles
7. Systemic analysis and decision-making

A CONFLUENT APPROACH

Most successful innovative, individualized and personalized educational programs are based upon a blend of cognitive and affective strategies. We have often ignored the affective domain and we need to emphasize it. One successful approach to affective strategies and outcomes is to adopt a strategy which blends both a behavioristic and a humanistic orientation to the affective domain. This behavioristic-humanistic approach can also be used with the cognitive domain.

Educators are doing well in the cognitive domain but the affective domain is often forgotten or ignored especially in practical application of taxonomies.

[13]For further information see "The Educational Sciences", Dr. Joseph Hill, Oakland Community College, Detroit, Michigan. Several papers on the use of the Educational Sciences at Canadore's Continuing Education Division are available from Dean Dudgeon at Canadore.

We need to emphasize education for the total person. That doesn't sound too new and it's certainly not a new idea. The Greeks saw this as the only worthwhile education. No aspect of the human potential was left to lie dormant. Knowledge, culture, athletics, human values and awareness were all a part of what Plato and Aristotle practiced every day of their lives.

The modern age has found itself caught up in technology. Our children have to be able to function, to manipulate within the technological environment. The use of technology in education should not be dehumanizing if we pay attention to the emotional aspect of learning. We can't go back to the golden age of Greece and ignore what's happening today. But sadly, in order to guarantee success on the intellectual side we've ignored the "feeling" component that accompanies every process. Certainly no one is to "blame" for this.

There is a growing recognition that education must equip the student to cope in the technological environment and cope in such a way that no part of his or her human potential will be ignored. This new emphasis is called confluent education. Very simply, confluent education is the philosophy and practice that takes into account both the intellectual demands of the complex society and the human potential needs of each individual student. Dr. George Brown defines confluent education as follows:

> "Confluent education is the term for the integration or flowing together of the affective and cognitive elements in individual and group learning - sometimes called humanistic of psychological education. Affective refers to the feeling or emotional aspects of experience and learning. How a child or adult feels about wanting to learn, how he feels as he learns, and what he feels after he has learned are included in the affective domain.
>
> Cognitive refers to the activity of the mind in knowing an object, to intellectual functioning. What an individual learns and the intellectual process of learning it would fall within the cognitive domain unless what is learned is an attitude or value, which would be affective learning."[14]

[14]George Isaac Brown, "Human Teaching for Human Learning", MacMillan Company of Canada, June 1972, pp. 3 and 4.

Confluent education can only come about by a re-thinking on the part of colleges. There needs to be a re-introduction of what has gradually eroded since the time of the Greeks - the affective or emotional aspects of experience and learning: how a student feels as he learns and how he feels after he learns.

The concept of confluent education is paralleled in the writings of the contemporary European philosopher Martin Heidegger. Heidegger's claim is that there is no intellectual process which exists in separation from an emotional counterpart. Emotions are just as must a part of the student in the classroom as are his or her intellectual abilities. We've been asking students to demonstrate their intellectual achievements and we try to judge them on the content of subject matter alone. But the graduates cannot exist on this alone. We want graduates who can cope in a world demanding more than knowledge of subject matter content. The new emphasis must be on the total human being with all of his or her potential for intellectual and emotional growth.

We need to re-think our emphasis in education. We cannot continue to emphasize only subject content and ignore emotion. We should begin to emphasize and implement a program of confluent education for the total person by building into our education programs situations that enhance emotional learning and growth as well as subject content.

THE REWARDS?

"A smile where once a frown grew.

A 'slow' group grasping difficult concepts because they experienced them.

Outcasts becoming involved.

'Behavior problems' trying to contribute.

Young people concerned about their world, and my world too.

Teen-agers seeking responsible solutions to their problems, and the problems of mankind.

Unafraid, committed, searching, open, communicative people, finding the joy of life.

> Kids who once were bored now bursting with new discoveries.
>
> Almost an entire grade level far surpassing those who preceded them.
>
> Not only in grades, but also in maturity, responsibility, creativity, appreciation, concern.
>
> I am changing.
>
> Others are too: other teachers, but most of all, our students."[15]

A STRATEGY FOR CHANGE

Educational change or changing should focus on the attainment of better learning outcomes and an attempt to reach each learner as an individual. One strategy for institutional change involves college managers who adopt, as policy, a commitment to permit innovative personnel to develop and implement their ideas. Any good change agent will be ineffective if college policy or senior administrators block his or her way.

Administrators should encourage the eclectic selection of the elements of instructional systems technology that will improve upon the efficiency in the management of learning. In this climate, administrators can hold all members of their organization responsible and accountable for student learning outcomes and the accurate measurement of learning. Administrators should not take a rigid position and must permit a blend of behavioristic and humanistic approaches to both the cognitive and affective domain.

DOES INSTITUTIONAL CHANGE COST?

Yes it does. Many colleges now have enough hardware for an individualized and personalized process but it may be either seldom or ineffectively used. Education tends to be a labor-intensive business and the re-deployment of resources based on educational technology and an instructional systems approach can lead to savings. Research and development has to be done and in the early stages this may negate cost savings but the end results will demonstrate trade-offs and pay-offs in cost savings.

[15]George Isaac Brown, "Human Teaching for Human Learning," MacMillan Company of Canada, June 1972, pp. 200-201.

Development cost, like any other cost, should be amortized.[16] Remember, cost benefits and savings are but one of many benefits of individualized and personalized education program.

ARRIVING AT INSTITUTIONAL CHANGE

At Canadore in the Continuing Education Division we have attempted institutional change using an instructional systems technology model. It has challenged many concepts of traditional educational management. Administrators, faculty and paraprofessionals in the Canadore Continuing Education Division, have changed and they support the implementation of new processes designed to increase learning outcomes. Administrators set budget priorities to ensure the achievement of desired instructional outcomes.

THE ROLE OF THE EDUCATIONAL DEVELOPMENT OFFICER

The key to institutional change is the change agent. In an instructional systems technology model for institutional change, the educational development officer[17] (instructional systems technologist) can be a key change agent. It is important to note that change agents can be trained. Educational development officers can implement systems, and then support and train administrators, instructors, paraprofessionals, and students, during and after the implementation of these systems. An educational development officer must be a trained instructional systems technologist and not just someone with an interest in the field. Too many administrators choose an educational development officer who is not trained and inevitably find that the level of implementation and the frustration of faculty and students varies with the degree of expertise of the educational development officer.

[16] See Gene L. Wilkinson, Needed Information for Cost Analysis, Educational Technology, July 1972.

[17] Sometimes also referred to as Faculty Education, Professional Development or Staff Development Officer.

THE INSTRUCTIONAL MANAGER

The management of learning demands that instructors are instructional managers who design and manage the learning process. Computer systems (both computer managed instruction CMI and computer assisted instruction CAI) are available to assist the instructional manager in his or her role. Computers can collect and tabulate evaluation data and dispense information. The instructional manager brings professional judgment in the role of designer and manager of learning. The instructional manager is the diagnostician, the professional resource person, the prescriber of instructional material and the interpreter of evaluation data. Innovative approaches to the management of instruction are an integral part of the process of institutional change in an instructional systems technology model.

WHERE WILL THE CHANGE MAKERS COME FROM?

We have changed and are continuing to change. We are concerned with the communication of educational innovation, and with innovation diffusion and adoption. We worry about where the institutional change makers will come from. We need to concentrate on the training of instructional systems technologists who are trained to act as change agents in institutions who wish to use an instructional systems technology model for institutional change. Consider these key statements from the UNESCO report "Learning To Be":

> Scientific and technical progress has three major consequences for education. We are now entitled to talk of a change in the learning process which is tending to displace the teaching process. New theories of learning highlight the principle of contiguity and the importance of needs and motivations, of choice of content, of the hierarchic nature of learning, the interrelationship between educational content and environment, etc. Learning practices are affected at present by the disorderly and sometimes competing relations between the various vehicles for transmitting knowledge, hence the need for multi-media systems to co-ordinate their utilization and effectiveness.

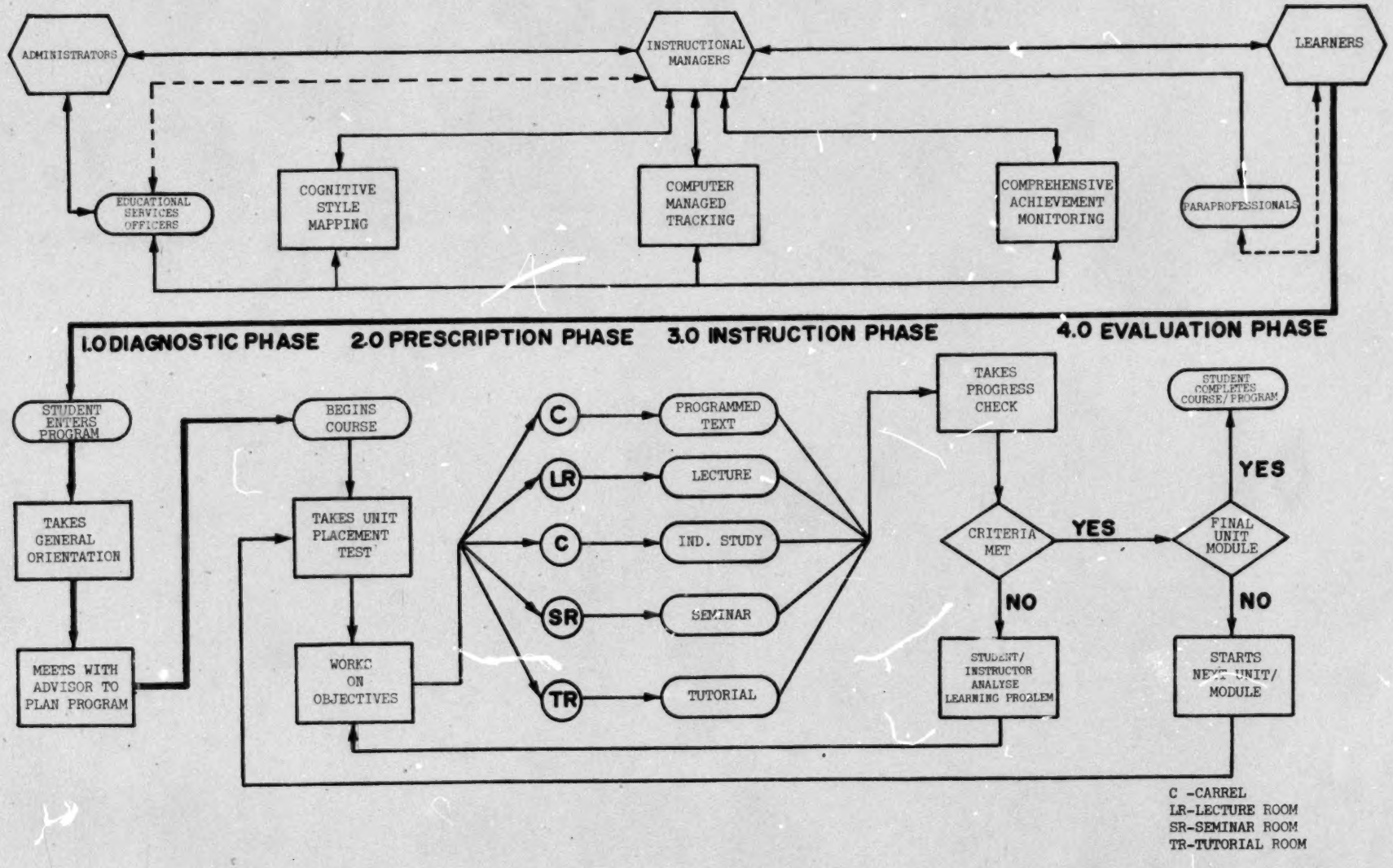
The second major consequence of advances in educational technology, according to the UNESCO report is:

> that it is impossible really to derive advantage from it without overhauling the entire educational edifice. The problem is not merely to modernize education from the outside, 'simply solving equipment problems, preparing programmes for using that equipment and inserting them into traditional pedagogic activities, but to make systematic use of available resources to develop a scientific awareness in the individual of methods of acquiring and using knowledge.' The aim is to avoid economic and financial wastage by co-ordinating those educational techniques which are at present available to us, as completely as possible. Educational technology is not just apparatus to be clamped on to a conventional system, adding to or multiplying traditional procedures. It can only be of value if it is really integrated into the entire system and if it leads us to re-think and renovate it.

The problem seems to be whether or not we can combine the concepts and techniques that are currently available to provide more effective instruction. Many institutions become dissatisfied with the process because they do not either:

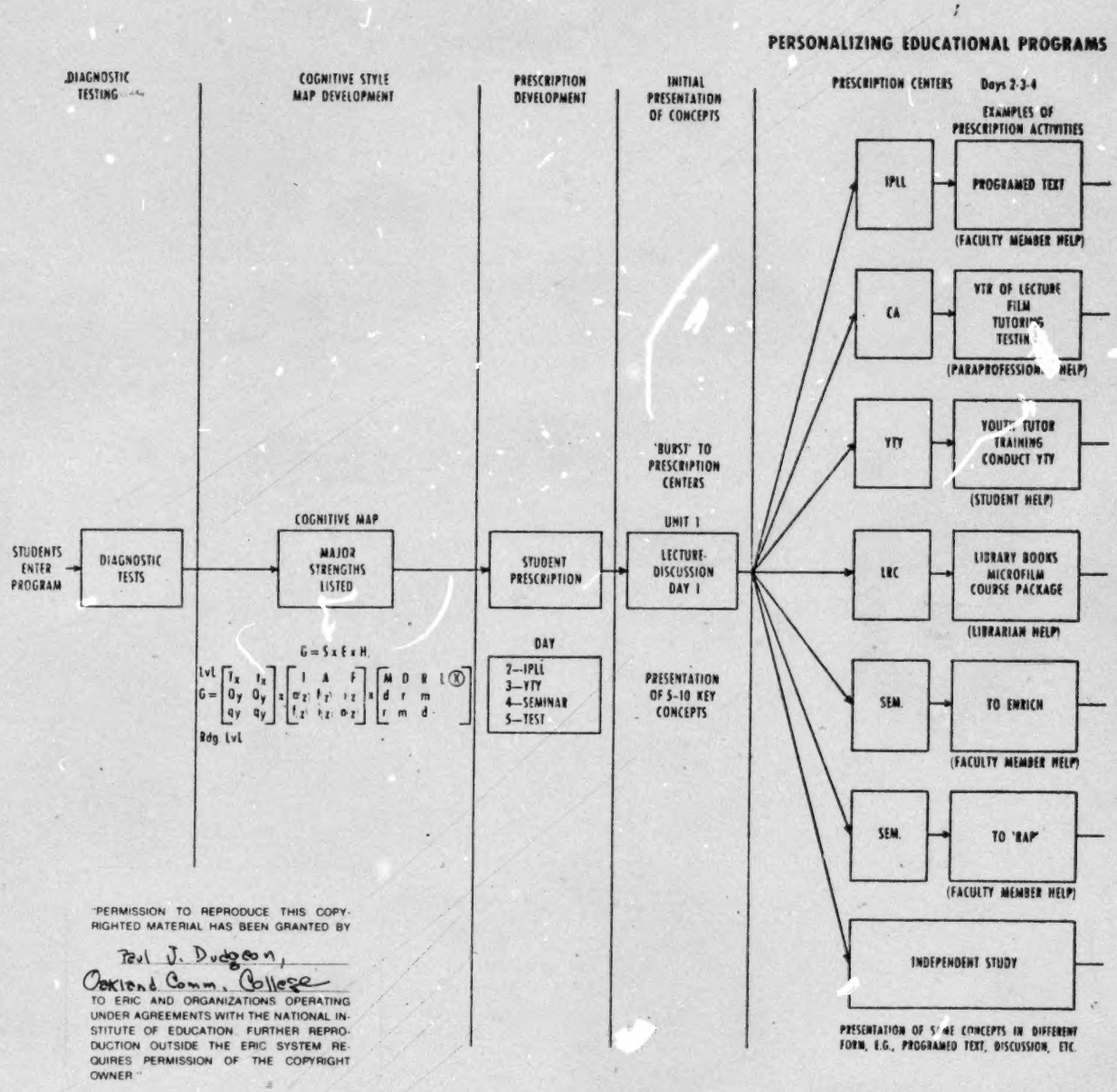
1. utilize enough techniques to solve the problems and/or

2. seek ways to integrate and maximize the effect of the various concepts and techniques of the instructional systems technologist. Many researchers and implementors get immersed in one technique or the other and avoid the type of work and experimentation that integrates the concepts and techniques. Perhaps this is only due to the fact that instructional systems technology is a young area where most instructional systems technology experts are still too busy researching and developing new concepts to worry much about integration of these concepts in practical implementations designed to gain maximum benefit for learners.


ADMINISTRATORS
INSTRUCTIONAL MANAGERS
LEARNERS
EDUCATIONAL SERVICES OFFICERS
COGNITIVE STYLE MAPPING
COMPUTER MANAGED TRACKING
COMPREHENSIVE ACHIEVEMENT MONITORING
PARAPROFESSIONALS
1.0 DIAGNOSTIC PHASE
2.0 PRESCRIPTION PHASE
3.0 INSTRUCTION PHASE
4.0 EVALUATION PHASE
STUDENT ENTERS PROGRAM
TAKES GENERAL ORIENTATION
MEETS WITH ADVISOR TO PLAN PROGRAM
BEGINS COURSE
TAKES UNIT PLACEMENT TEST
WORKS ON OBJECTIVES
C
LR
C
SR
TR
PROGRAMMED TEXT
LECTURE
IND. STUDY
SEMINAR
TUTORIAL
TAKES PROGRESS CHECK
CRITERIA MET
YES
NO
STUDENT/ INSTRUCTOR ANALYSE LEARNING PROBLEM
FINAL UNIT MODULE
YES
NO
STUDENT COMPLETES COURSE/ PROGRAM
STARTS NEXT UNIT/ MODULE
C -CARREL
LR-LECTURE ROOM
SR-SEMINAR ROOM
TR-TUTORIAL ROOM

PEP

Flow Chart of Personalized Educational Program (PEP) Illustrating Student Progress From Diagnostic Testing Through Successful Completion of an Instructional Unit.



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PERSONALIZING EDUCATIONAL PROGRAMS
UTILIZING COGNITIVE STYLE MAPPING

OAKLAND COMMUNITY COLLEGE
DR. JOSEPH E. HILL, PRESIDENT
DR. DEREK N. NUNNEY, VICE PRESIDENT

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FIGURE 2A

UTILIZING COGNITIVE STYLE MAPPING

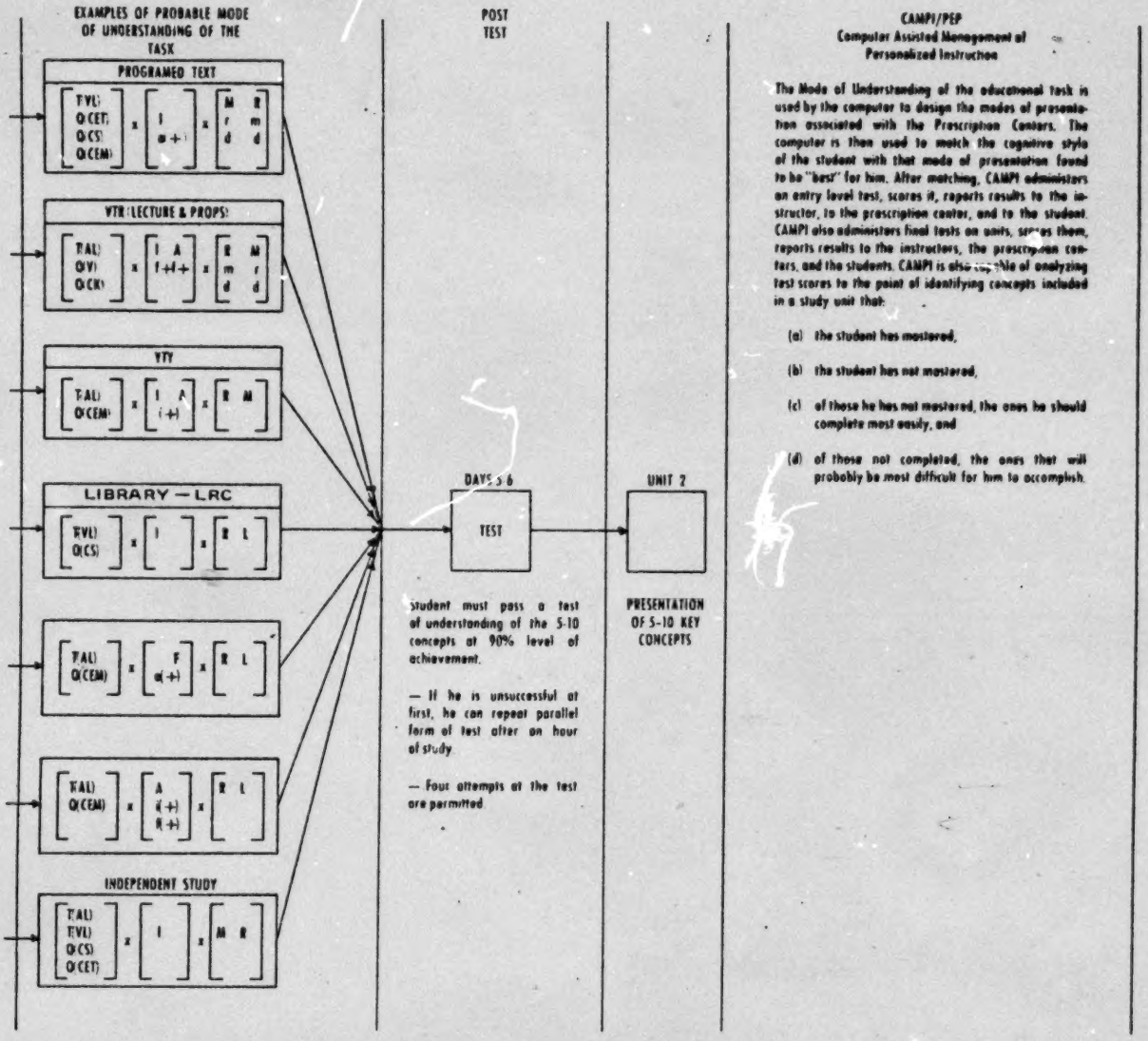

EXAMPLES OF PROBABLE MODE OF UNDERSTANDING OF THE TASK
PROGRAMED TEXT
VTR (LECTURE & PROPS)
VTY
LIBRARY — LRC
INDEPENDENT STUDY
POST TEST
DAYS 5 & 6
TEST
UNIT 2
Student must pass a test of understanding of the 5-10 concepts at 90% level of achievement.
— If he is unsuccessful at first, he can repeat parallel form of test after an hour of study.
— Four attempts at the test are permitted.
PRESENTATION OF 5-10 KEY CONCEPTS
CAMPI/PEP
Computer Assisted Management of Personalized Instruction
The Mode of Understanding of the educational task is used by the computer to design the modes of presentation associated with the Prescription Centers. The computer is then used to match the cognitive style of the student with that mode of presentation found to be "best" for him. After matching, CAMPI administers an entry level test, scores it, reports results to the instructor, to the prescription center, and to the student. CAMPI also administers final tests on units, scores them, reports results to the instructors, the prescription centers, and the students. CAMPI is also capable of analyzing test scores to the point of identifying concepts included in a study unit that:
(a) the student has mastered,
(b) the student has not mastered,
(c) of those he has not mastered, the ones he should complete most easily, and
(d) of those not completed, the ones that will probably be most difficult for him to accomplish.

FIGURE 2B

FIGURE 3

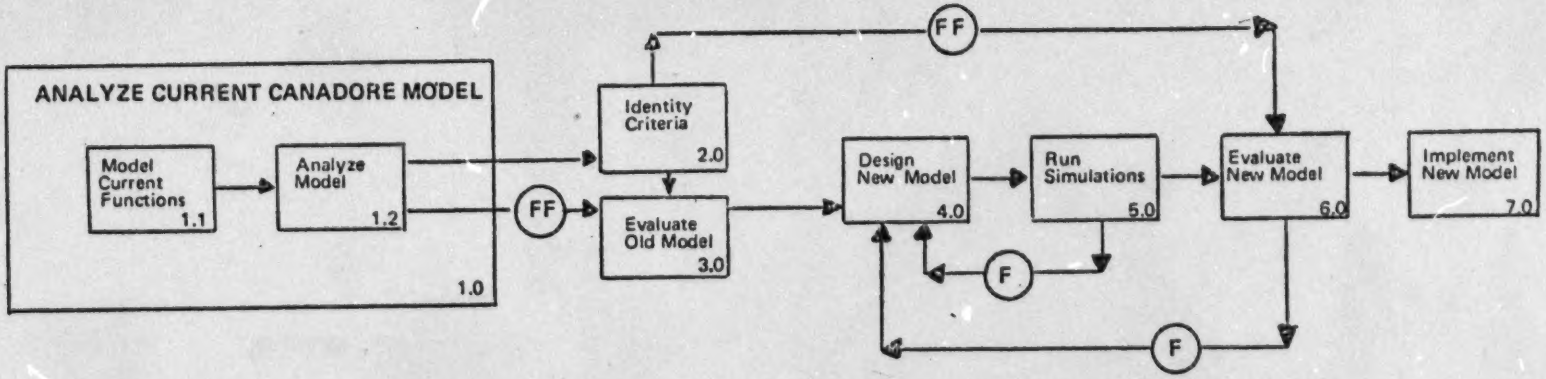
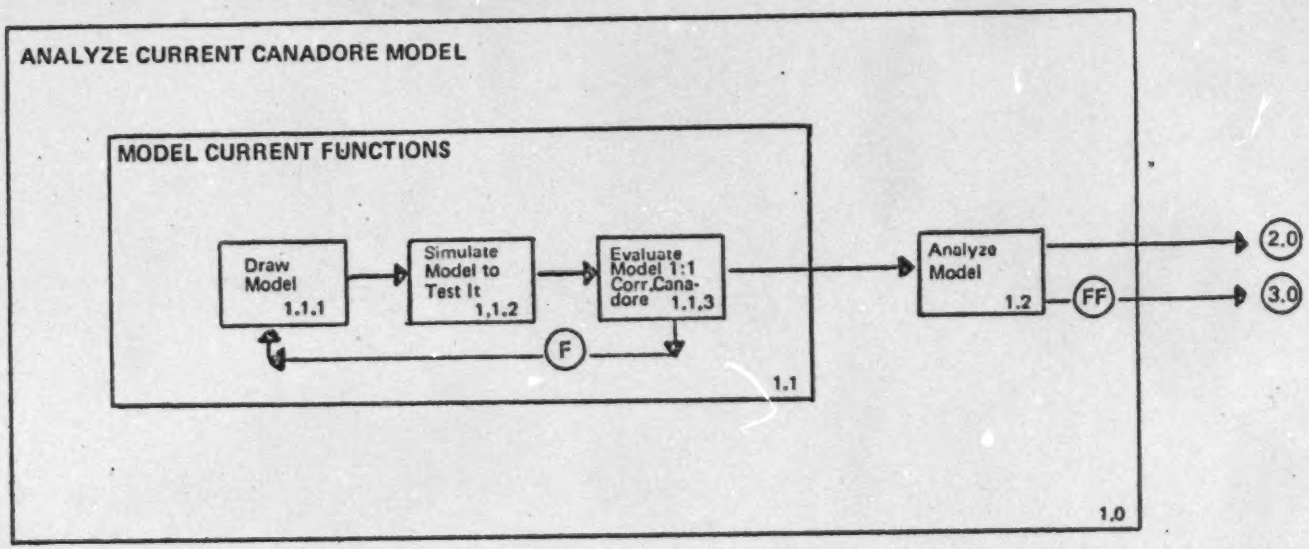
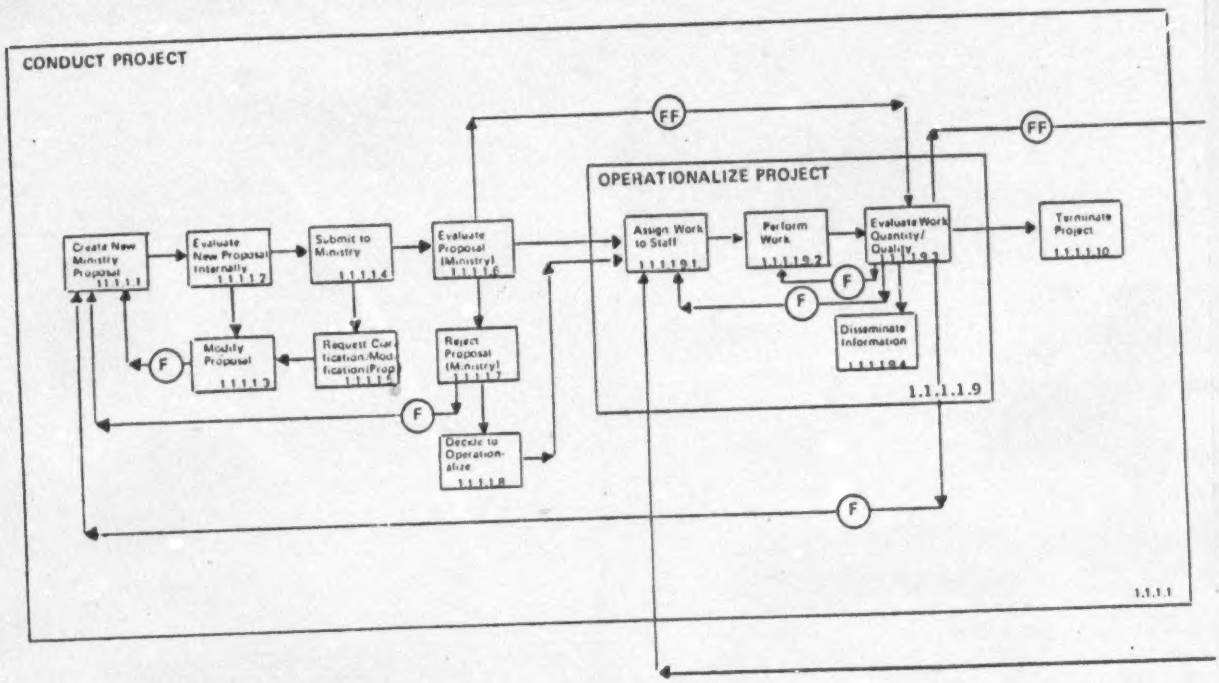


FIGURE 4




CONDUCT PROJECT
OPERATIONALIZE PROJECT
Create New Ministry Proposal
1.1.1.1
Evaluate New Proposal Internally
1.1.1.2
Submit to Ministry
1.1.1.4
Evaluate Proposal (Ministry)
1.1.1.6
Assign Work to Staff
1.1.1.9.1
Perform Work
1.1.1.9.2
Evaluate Work Quantity/ Quality
1.1.1.9.3
Terminate Project
1.1.1.10
Modify Proposal
1.1.1.3
Request Clarification/Modification(Prop)
1.1.1.5
Reject Proposal (Ministry)
1.1.1.7
Disseminate Information
1.1.1.9.4
Decide to Operationalize
1.1.1.8
1.1.1.9
1.1.1.1
FF
FF
F
F
F
F

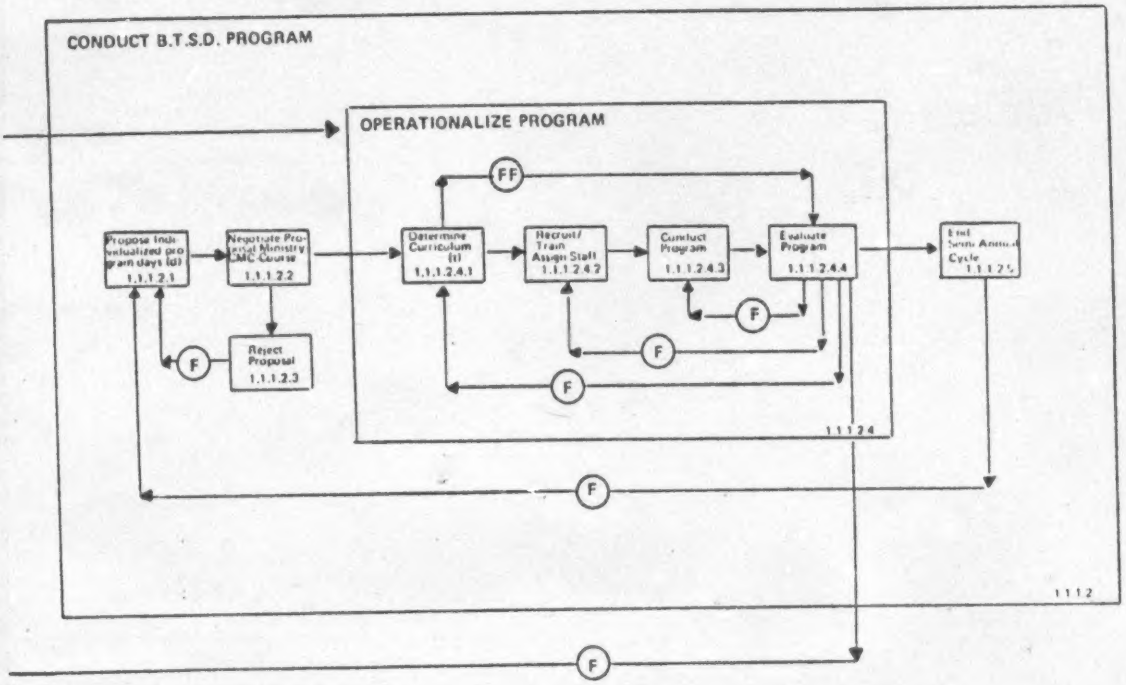
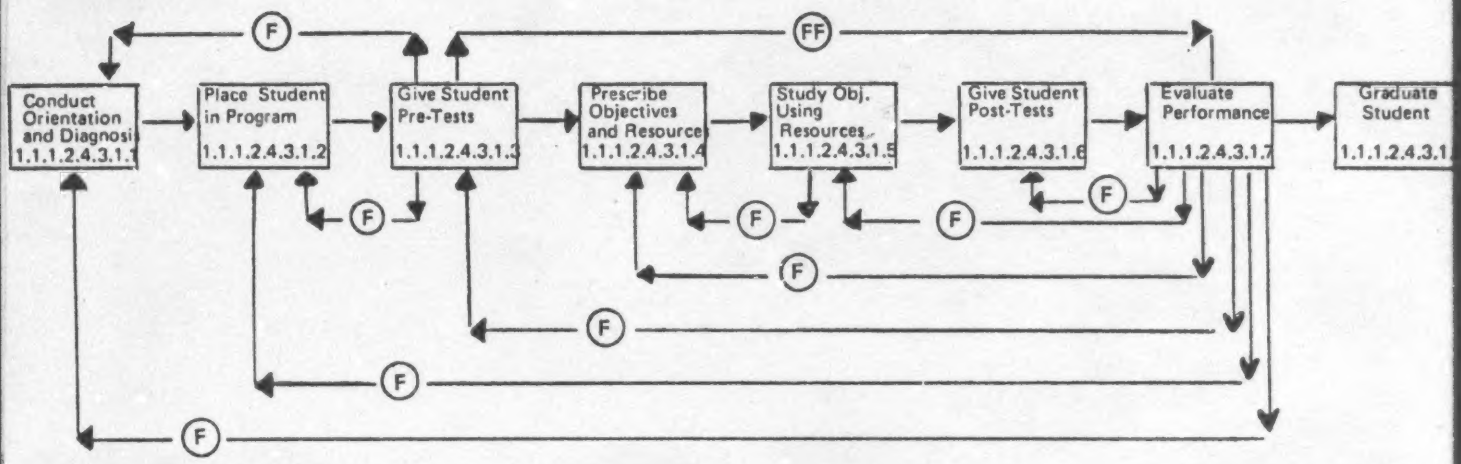

CONDUCT B.T.S.D. PROGRAM
OPERATIONALIZE PROGRAM
FF
Propose Individualized program days (d)
1.1.1.2.1
Negotiate Provincial Ministry CMC Course
1.1.1.2.2
Determine Curriculum (t)
1.1.1.2.4.1
Recruit/ Train Assign Staff
1.1.1.2.4.2
Conduct Program
1.1.1.2.4.3
Evaluate Program
1.1.1.2.4.4
End Semi-Annual Cycle
1.1.1.2.5
Reject Proposal
1.1.1.2.3
F
1.1.1.2.4
1.1.1.2

FIGURE 5

CONDUCT INSTRUCTION



1.1.1.2.4.3.1

FIGURE 6

FIGURE 7

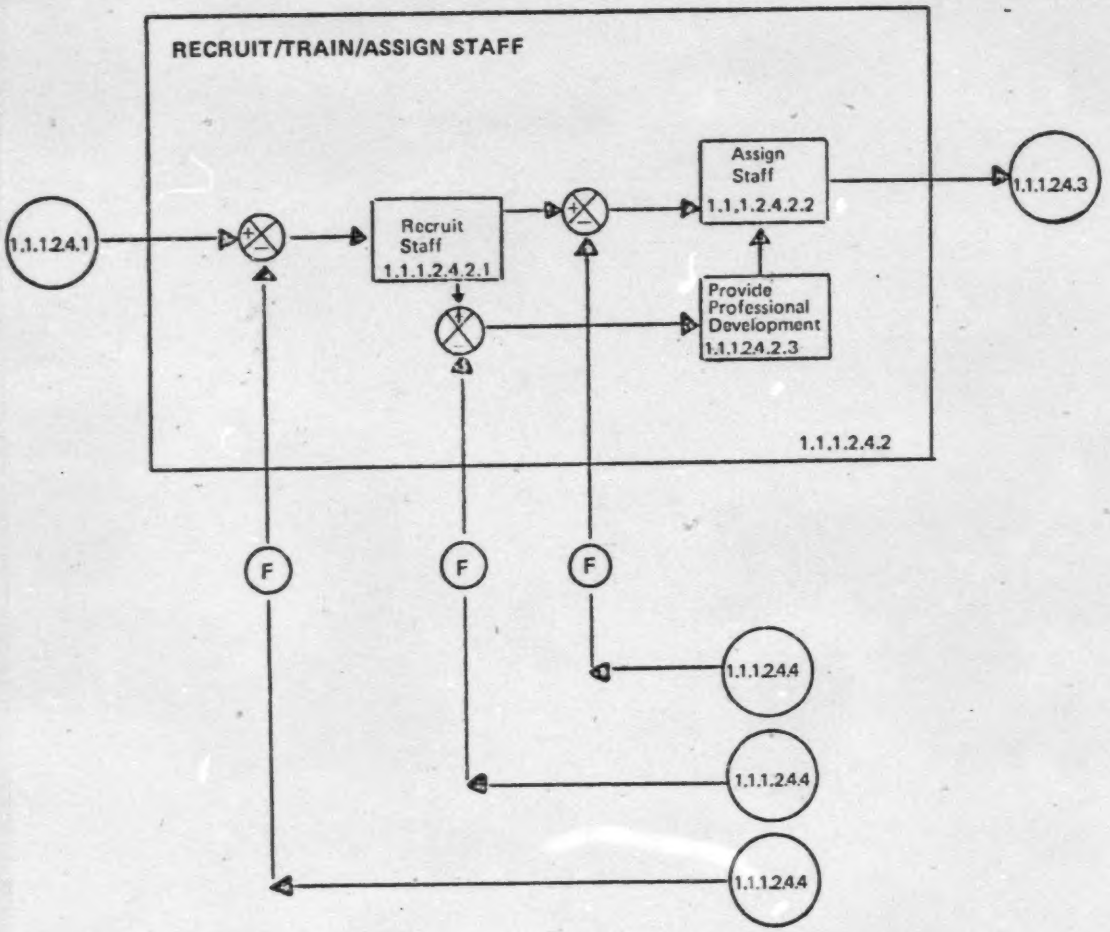
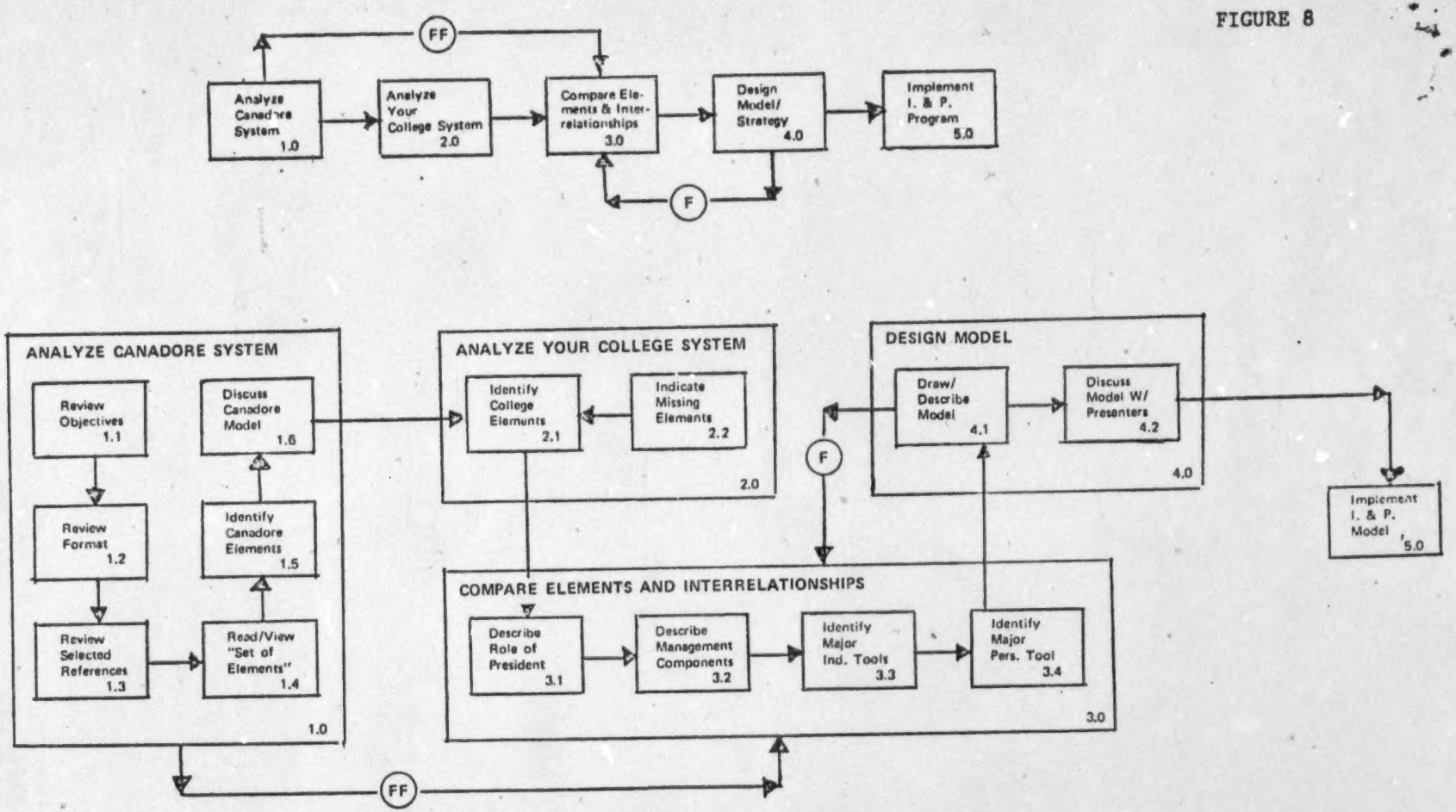

RECRUIT/TRAIN/ASSIGN STAFF
1.1.1.2.4.1
Recruit Staff
1.1.1.2.4.2.1
Assign Staff
1.1.1.2.4.2.2
1.1.1.2.4.3
Provide Professional Development
1.1.1.2.4.2.3
1.1.1.2.4.2
F
F
F
1.1.1.2.4.4
1.1.1.2.4.4
1.1.1.2.4.4

FIGURE 8


FF
Analyze Canadore System 1.0
Analyze Your College System 2.0
Compare Elements & Interrelationships 3.0
Design Model/ Strategy 4.0
Implement I. & P. Program 5.0
F
ANALYZE CANADORE SYSTEM
Review Objectives 1.1
Review Format 1.2
Review Selected References 1.3
Read/View "Set of Elements" 1.4
Identify Canadore Elements 1.5
Discuss Canadore Model 1.6
1.0
ANALYZE YOUR COLLEGE SYSTEM
Identify College Elements 2.1
Indicate Missing Elements 2.2
2.0
DESIGN MODEL
Draw/ Describe Model 4.1
Discuss Model W/ Presenters 4.2
4.0
Implement I. & P. Model 5.0
COMPARE ELEMENTS AND INTERRELATIONSHIPS
Describe Role of President 3.1
Describe Management Components 3.2
Identify Major Ind. Tools 3.3
Identify Major Pers. Tool 3.4
3.0
F
FF